

**CLAIMS**

What is claimed is:

1. A fixed wavelength, external cavity semiconductor laser, comprising:  
a semiconductor gain medium;  
5 an intracavity filter having a filter function specifying a frequency of operation of  
the laser; and  
modulation system that modulates an optical length of the cavity to change spectral  
locations of longitudinal modes of the cavity relative to the filter function.
- 10 2. A laser as claimed in claim 1, wherein the intracavity filter is angled relative to an  
axis of the cavity to avoid coupling of light reflected by the intracavity filter into the  
semiconductor gain medium.
- 15 3. A laser as claimed in claim 1, further comprising two polarization rotators, on  
either side of the intracavity filter, that rotate a polarization of light in the cavity with  
the light at the filter function having a polarization for amplification in the  
semiconductor gain medium and light outside the filter function being at an orthogonal  
polarization.
- 20 4. A laser as claimed in claim 3, wherein the polarization rotators comprise  
quarterwave plates.
5. A laser as claimed in claim 3, wherein the polarization rotators comprise  
subwavelength period gratings.
6. A laser as claimed in claim 1, wherein the semiconductor gain medium is a  
semiconductor optical amplifier.
7. A laser as claimed in claim 1, wherein the semiconductor gain medium has an  
antireflection coated front facet and a backfacet coated to be reflective.

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17. A laser as claimed in claim 1, wherein temperature of the system is allowed to fluctuate with ambient temperature.

18. A laser as claimed in claim 1, wherein the modulation system comprises a deflectable MEMS structure.

5 19. A laser as claimed in claim 1, wherein the modulation system comprises a deflectable membrane structure.

20. A laser as claimed in claim 1, wherein the modulation system comprises a semiconductor substrate.

21. An intracavity composite filtering structure, comprising:

10 spectral filter material;  
a polarization rotator attached to one side of the filter material; and  
a collimating lens attached to the filter material for coupling a beam into and/or out  
of the filter material.

15 22. A structure as claimed in claim 21, wherein the polarization rotator comprises a quarterwave plate.

23. A structure as claimed in claim 21, wherein the polarization rotator comprises a subwavelength period grating.

20 24. A structure as claimed in claim 21, further comprising another polarization rotator attached to an opposite side of the filter material relative to the other polarization rotator.